



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2031-1, City of Belle Fourche**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Agriculture and Natural Resources concerning Water Permit Application No. 2031-1, City of Belle Fourche, 511 6th Avenue, Belle Fourche SD 57717.

The Chief Engineer is recommending APPROVAL of Application No. 2031-1 with a twenty-year term pursuant to SDCL 46-1-14 and 46-2A-20 because 1) although evidence is not available to justify issuing this permit without a 20 year term limitation, there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights, 3) the proposed use is a beneficial use and 4) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board with the following qualifications:

1. In accordance with SDCL 46-1-14 and 46-2A-20, Permit No. 2031-1 is issued for a twenty-year term. Pursuant to SDCL 46-2A-21, the twenty-year term may be deleted at any time during the twenty-year period or following its expiration. If the twenty-year term is not deleted at the end of the term, the permit may either be cancelled or amended with a new term limitation of up to twenty years. Permit No. 2031-1 may also be cancelled for nonconstruction, forfeiture, abandonment or three permit violations pursuant to SDCL 46-1-12, 46-5-37.1 and ARSD 74:02:01:37.
2. The well will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner, under these Permits shall control withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
3. The well authorized by Permit No. 2031-1 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
4. The Permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Madison aquifer.
5. Water Permit No. 2031-1 appropriates up to 960 acre-feet of water annually.

See report on application for additional information.

Eric Gronlund, Chief Engineer
July 6, 2023

**Report to the Chief Engineer on
Water Permit Application No. 2031-1
City of Belle Fourche
28 June 2023**

Water Permit Application No. 2031-1 proposes to appropriate 960 acre-feet of water annually (ac-ft/yr) at a maximum diversion rate of 2.22 cubic feet of water per second (cfs), which is equivalent to 1,000 gallons per minute, from one well to be completed into the Madison aquifer located in the NE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 34-T8N-R2E Black Hills Meridian for municipal use. This site is located on the south side of Belle Fourche, South Dakota.

Aquifer: Madison Limestone (MDSN)

Hydrogeologic Characteristics

The Madison Group in South Dakota is a Lower Mississippian and Upper Devonian group of formations that in the Black Hills consists of the Englewood and Pahasapa Limestone formations [1]. The Pahasapa Limestone is a “white, light-gray to tan, fine- to medium-grained limestone and dolomite containing brown to gray chert” [2]. The Englewood Limestone is a “pink to lavender to light-gray, thin- to medium-bedded, fine- to medium-grained, argillaceous, dolomitic limestone” [2]. The Madison aquifer consists of the permeable and porous portions of the Madison Group that are sufficiently saturated to deliver useful quantities of water. The Madison aquifer extends over more than 210,000 square miles in Montana, Wyoming, North Dakota, South Dakota, and Nebraska [3], although it may not be suitable as a source of water in all of those areas due to extreme depth to the aquifer and poor water quality far from the outcrops [4]. It crops out in the Black Hills and is buried elsewhere in South Dakota [3]. The Madison aquifer may be hydrologically connected to the underlying Deadwood aquifer. It is also hydrologically connected to the overlying Minnelusa aquifer [5]. The Minnelusa aquifer overlies the Madison unconformably [1], which means there was a period of erosion or weathering between when the Madison Group and the Minnelusa Formation were deposited. Transmissivity in the Madison aquifer mainly comes from secondary porosity features such as solution cavities, faults, and fractures [5]. Because most of the transmissivity in the Madison aquifer comes from secondary porosity features, aquifer characteristics in the Madison aquifer vary greatly from location to location [5].

The applicant did not submit a well completion report but indicated the target aquifer was the Madison, but sufficient information is available to determine the availability of water and possibility of unlawful impairment of existing water rights. In the area of this application, the top of the Madison Group is likely to occur at 1,350 feet above NGVD29 [6] and the top of the Deadwood Formation is likely to occur at 450 feet above NGVD29 [7], giving an estimated thickness of the Madison Group of 900 feet. The potentiometric surface can be linearly interpolated from contours to be an estimated 3,440 feet above NGVD29 [8]. Land surface at the proposed diversion point is 1,060.4 meters above NAVD88 [9], or approximately 3,477 feet above NGVD29 [10]. There is also a well completion report on file with the Water Rights Program for a well located in the SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 33-T8N-R2E associated with Water Right No. 1311-1. The land elevation at the site of that well completion report is approximately 1,001.8

meters above NAVD88, or approximately 3,284 feet above NGVD29 [10]. The driller indicated encountering limestone from 2,110 to 2,220 feet below grade and that fractures produced water from 2,150 to 2,175 feet below grade. The well flowed at 375 gallons per minute at the time the well was completed on March 11, 1980. The driller did not indicate where the top of the Madison Group is for this well, but Water Rights Staff Engineer James Goodman indicated no disagreement during analysis of the application that the well was completed into the Madison aquifer [11]. Based on well completion reports near this application, it is possible that the well for this application will flow at land surface.

Applicable South Dakota Codified Law (SDCL)

Pursuant to SDCL 46-2A-9, a permit to appropriate water may be issued if there is reasonable probability that there is unappropriated water available for the applicant's proposed use, that the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights, and that the proposed use is a beneficial use and in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board. This report will only assess the availability of water and possibility of developing this application without unlawful impairment of existing domestic water uses and water rights.

Pursuant to SDCL 46-6-3.1, no application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of the water to the groundwater source. An exception allows water distribution systems to withdraw from groundwater sources older or stratigraphically lower than the Greenhorn Formation regardless of the results of a hydrologic budget. The Madison aquifer is older and stratigraphically lower than the Greenhorn Formation and the applicant is a water distribution system as defined in SDCL 46-1-6(17). Therefore, the Water Management Board's authority to approve this application is not restricted by whether recharge exceeds withdrawals. However, a statewide and local hydrologic budget is included in this report for the information of the Chief Engineer and the Water Management Board.

Pursuant to SDCL 46-2A-20:

Notwithstanding §§ 46-1-14 and 46-2A-7, no water permit for construction of works to withdraw water from the Madison formation in Butte, Fall River, Custer, Lawrence, Meade and Pennington counties may be issued for a term of more than twenty years, unless the Water Management Board determines, based upon the evidence presented at a hearing that:

(1) Sufficient information is available to determine whether any significant adverse hydrologic effects on the supply of water in the Madison formation would result if the proposed withdrawal were approved; and

(2) The information, whether provided by the applicant or by other means, shows that there is a reasonable probability that issuance of the proposed permit would not have a significant adverse effect on nearby Madison formation wells and springs.

This application proposes to withdraw water from the Madison aquifer in one of the counties listed above. Therefore, in addition to the other requirements, the Water Management Board must consider the effect this application may have on nearby Madison aquifer wells and springs and this application is subject to a 20-year term limit.

Availability of Water

Statewide Hydrologic Budget

Statewide Recharge

The Madison aquifer receives recharge from infiltration of precipitation and streamflow on the outcrop area and may also receive inflow from the underlying Deadwood aquifer [12]. There are several reports available estimating recharge to the Madison aquifer which have been referenced by Water Rights Staff in previous reports to the Chief Engineer.

Woodward-Clyde Consultants [13] estimated recharge to the outcrop of the Madison aquifer in the Black Hills as part of an environmental impact statement for the ETSI Coal Slurry Pipeline Project. The upper-bound estimate of recharge in the Woodward-Clyde Consultants report is approximately 400,000 ac-ft/yr, assuming almost all of the precipitation that falls on the outcrop infiltrates into the aquifer [13]. Woodward-Clyde Consultants produced a lower-bound recharge estimate of 140,000 ac-ft/yr based on the Rahn and Gries [14] report [13]. However, the Rahn and Gries report estimated recharge for all Paleozoic limestone in the Black Hills, which includes the Madison Group, the Minnelusa Formation, and the Minnekahta Formation [14]. Rahn and Gries [14, p. 15] reported that 146.14 cfs was their minimum estimated recharge rate for the Paleozoic limestone from infiltration of precipitation, which converts to approximately 106,000 ac-ft/yr for all Paleozoic formations. The Woodward-Clyde Consultants report did not acknowledge the fact that the Rahn and Gries [14] report estimated minimum recharge for a larger group of formations than the Woodward-Clyde Consultants report covers, and therefore was likely to overestimate recharge to the Madison aquifer under the assumptions made [13].

Carter, Driscoll, and Hamade [12] analyzed streamflow and precipitation data from water years 1931 to 1998 in the Black Hills area in South Dakota and Wyoming to determine the average annual recharge to the Madison and Minnelusa aquifers. They estimated a combined average annual recharge to both aquifers to be 344 cfs, or approximately 249,000 ac-ft/yr, not including possible flow from the Deadwood aquifer [12]. Carter, Driscoll, and Hamade [12] estimated that approximately 55% of the recharge goes to the Madison aquifer, so the total estimated average recharge to the Madison aquifer from the outcrop in the Black Hills is 137,000 ac-ft/yr, not including possible inflow from adjacent aquifers or from the Madison aquifer outside of South Dakota. The Carter, Driscoll, and Hamade [12] report uses more years of data, more recent data, and better assumptions than the Woodward-Clyde Consultants [13] and Rahn and Gries [14] reports. Therefore, the best estimate of recharge to the Madison aquifer is based on the Carter, Driscoll, and Hamade [12] report.

Statewide Discharge

Discharge from the Madison aquifer in South Dakota is mainly by outflow to other aquifers when the hydraulic head in the Madison aquifer is higher than the other aquifers, outflow to

springs and seeps, and withdrawals by domestic and appropriative wells [15]. Due to the presence of overlying aquifers and water distribution systems in many areas of the aquifer, domestic well withdrawals are a negligible portion of the hydrologic budget of the Madison aquifer. There are 166 water rights/permits currently authorized to withdraw from the Madison aquifer and 11 future use water rights/permits reserving water from the Madison aquifer. Table 1 shows the future use permits reserving water from the Madison aquifer [11].

Of the 166 active water rights/permits, 101 are primarily for some type of water distribution system (rural water system, municipal, etc), 31 primarily for irrigation, 14 for commercial use, 11 for industrial use, 4 for domestic use, 2 for geothermal use, 2 for institutional use, and one for recreation [11]. Estimated withdrawals for irrigation use are shown in Table 2. When there were more than 10 years of irrigation reports available, the average reported irrigation was used to estimate irrigation withdrawals. When there were fewer than 10 years of irrigation reports available, withdrawals are assumed to equal two acre-feet per acre, although actual usage is likely less for non-turf irrigation. Non-irrigation withdrawals from permit holders with irrigation also being a permitted use are assumed to withdraw at their maximum instantaneous diversion rate 60% of the time. In the case of Water Right No. 1885-1, that would have caused the total estimated withdrawal to exceed the rate they were physically capable of withdrawing, so their total estimated withdrawal is 100% of their maximum instantaneous diversion rate.

Table 1: Future Use Permits from the Madison aquifer [11]

Permit No.	Name/Business	County	Use	Priority Date	Amount Reserved (ac-ft/yr)
2028-1	Bear Butte Valley Water, Inc	MD	RWS, WDS	3/23/2023	440
369-1	City of Belle Fourche	LA	MUN	12/10/1958	620
2086-2	City of Rapid City	PE	MUN	05/18/1989	4,075
439-2	City of Rapid City	PE	MUN	09/22/1956	3,367
1872-1	City of Spearfish	LA	MUN	11/13/2006	1,599
2560-2	Fall River Water Users District	FR	RWS	05/16/2005	358
2560A-2	Fall River Water Users District	FR	RWS	05/16/2005	0
2560B-2	Fall River Water Users District	FR	RWS	05/16/2005	0
2580-2	Southern Black Hills Water System	FR	RWS	03/02/2006	1,474
1833-2	Weston Heights Home Owners	MD	RWS	02/18/1983	211
1995-1	Black Hawk Water User District	MD	RWS	04/15/2020	1,300
Total					13,444
FR – Fall River, LA – Lawrence, MD – Meade, PE – Pennington					
MUN – Municipal, RWS – Rural Water System					

Water Right/Permit Nos. 1096-1, 1096A-1, 1496-1, and 1670-1 are all authorized to withdraw from the same well and one dam. Water Right Nos. 1096-1, 1096A-1, 1670-1 authorize diversion of water for irrigation use and Water Right No. 1096A-1 and Water Permit No. 1496-1 authorize diversion of water for rural water system use. Documentation in the administrative file for Water Right No. 1670-1 indicates that the well is not valved such that it can be shut off when not in use

Report on Water Permit App. No. 2031-1

for the beneficial uses listed on the permits. A letter dated September 9, 1998 indicates that when the water for that well is not being used for the beneficial uses described in the permits, it is used for fish and wildlife propagation. The person writing the letter indicated they would prefer the Water Management Board not order the well to be shut off when not used for irrigation or rural water system withdrawals. It is likely the well continues to flow uncontrolled; thus, at the flow rate listed in Water Right No. 1096A-1 of 1.33 cfs, that well withdraws approximately 964 ac-ft/yr from the Madison aquifer.

Table 2: Permits with irrigation listed as one beneficial use, or are connected to an irrigation permit [11] [17]

Permit No.	Name/Business	Diversion rate (cfs)	Acres Licensed/ Permitted	Average Report (ac-ft/yr)	Years of Irrigation Reports	Estimated average irrigation (ac-ft/yr)	Est. Non-irr. Use (ac-ft/yr)	Total Est. Withdrawal (ac-ft/yr)
2773-2	Arrowhead Country Club	1.110	100.00	0	4	200.0	0.0	200.0
1635-1	Black Hills National Cemetery	0.820	54.50	94.8	26	94.8	356.4	451.2
1452-1	Black Hills State College	3.330	25.44	20.3	33	20.3	1,447.5	1,467.8
1670-1	Buddy L, Peggy A, Kami S Ireland	3.610	253.00	47.5	24	*	*	*963.5
1096A-1	Butte Meade Sanitary Dist	1.330	0.00	N/A	0	*	*	*
2458-2	City of Rapid City	0.800	107.00	104.4	21	104.4	0.0	104.4
2002-1	City of Spearfish	1.330	40.00	0.0	1	80.0	0.0	80.0
2313-2	Coca-Cola Bottling	0.330	3.00	7.3	27	7.3	143.4	150.7
1899-1	Davis Ranches Inc	1.430	100.00	0.0	13	0.0	0.0	0.0
2673-2	Diocese of Rapid City	0.120	7.00	8.0	9	14.0	0.0	14.0
1009-1	Donald F/Ann J Brady	0.780	53.73	30.4	40	30.4	0.0	30.4
1185-1		0.380	22.52	110.3	40	110.3	***	110.3
2286-2	Donald Konechne	0.100	38.50	10.2	28	10.2	0.0	10.2
1707A-1	Elkhorn Ridge @ Frawley Ranches LLC	3.705	100.00	0.0	4	0.0	1,610.5	1,610.5
1707E-1		0.000	0.00	9.1	15	9.1	**	9.1
1931-1		0.170	3.30	3.2	9	6.6	73.9	80.5
1650-1	Foothill Land & Cattle LLC	0.890	0.00	N/A	0	*	*	*55.9
1945-1	Frawley Ranches LLC	1.110	265.00	50.7	8	530.0	0.0	530.0
1858-1	Glencoe Camp Resort II LLC	0.860	34.00	0.0	16	0.0	373.8	373.8
2593-2	Hart Ranch Development	0.490	72.50	19.9	15	19.9	213.0	232.9
1911-2	Hart Ranch Development Co	0.880	124.00	120.1	28	120.1	382.5	502.6
1725-2	Janice R Crowser	1.070	75.10	1.0	23	1.0	0.0	1.0
2012-1	Jesse Horstmann	0.500	43.50	N/A	0	87.0	0.0	87.0
1923-1	Jim Montieth	0.110	3.00	1.0	10	6.0	47.8	53.8
858-2	John & Heidi McBride	9.360	655.75	6.7	38	6.7	0.0	6.7
1885-1	John T & Veronica Widdoss	0.110	22.00	16.8	5	44.0	35.7	79.7
1223-1	Montana Dakota Land LLC	0.670	263.00	195.4	40	195.4	0.0	195.4
1960-1	One Diamond Inc	1.280	150.00	148.9	6	300.0	556.4	856.4
2013-1	Santa Maria Land and Cattle Corp.	2.220	460.00	N/A	0	920.0	0.0	920.0
1363-1	Spearfish Canyon Country Club	0.900	80.10	63.3	35	63.3	0.0	63.3
2106-2	Stuart Rice	0.080	2.80	0.8	30	0.8	34.8	35.6
1842-1	Tom C Davis	0.440	330.00	0.0	17	0.0	0.0	0.0
2741-2	Tubbs Land & Cattle LLC	3.340	567.00	149.5	3	1,134.0	0.0	1,134.0
419-2	Wind Cave National Park	0.150	6.00	N/A	0	12.0	65.2	77.2
Total		43.805	4,061.7	1,327.8	-	4,136.7	5,340.9	10,497.0

* Discussed in text. **gives additional time to develop 1707A-1. *** Reports all use types in irrigation report

Water Right No. 1650-1 does not require the water right holder to report annual withdrawals and allocates no acreage. It provides supplemental water supply from a flowing well for Water Right No. 1231-1. Water Right No. 1231-1 permits a 110 acre-ft dam to provide water for a

commercial livestock operation and irrigation of 134 acres. Water Right No. 1650-1 allows for direct irrigation from a Madison aquifer well of up to 2 acre-ft per acre for the land permitted by Water Right No. 1231-1. Kilts estimated that Water Right No. 1650-1 withdraws 55.9 ac-ft/yr [16].

There are 43 water rights/permits that have a volume limit listed in their permit or have had their total withdrawal limited by a subsequent water right/permit held by the same person/entity. While many of those water rights/permits are required to report their withdrawals, they may develop their permits further to withdraw up to the limit on their permit, so the volume limit listed on their permits is assumed to be their total appropriation. The total volume limit listed by such permits is 24,536 ac-ft/yr.

There are 89 non-irrigation water rights/permits that do not have a volume limit listed in their permit and are not discussed above. They are estimated to withdraw their maximum instantaneous diversion rate 60% of the time, for a total estimated withdrawal of 16,897 ac-ft/yr. Based on Water Rights Staff experience, this estimate is likely to be higher than the actual withdrawals by those water rights/permits.

In addition to the potential withdrawals by future use permits described above, four other applications are deferred, held in abeyance, or pending review. Water Permit Application No. 2585-2 for Southern Black Hills Water System proposes to appropriate 1,600 ac-ft/yr but is deferred for further study. Water Permit Application No. 2685-2 for Powertech, Inc is held in abeyance pending federal permitting and proposes to appropriate 889 ac-ft/yr. Water Permit Application No. 2850-2 proposes to appropriate up to 145 ac-ft/yr and is pending approval following the Water Management Board adopting the Findings of Facts, Conclusions of Law, and Final Decision on the matter of that application in the July 12, 2023 meeting. Water Permit Application Nos. 2029-1 and 2030-1 propose to place to beneficial use 426 and 679 ac-ft/yr, respectively, for the City of Spearfish. The amount the City of Spearfish intends to place to beneficial use has been removed from the amount reserved for future use in the hydrologic budget.

Summary of Statewide Hydrologic Budget

The best available estimate of recharge to the Madison aquifer in South Dakota is approximately 137,000 ac-ft/yr. The estimated withdrawals as described in the Statewide Discharge section are summarized in **Error! Reference source not found.** The total estimated withdrawal, including withdrawals reserved for future use and held, or deferred applications is approximately 69,113 ac-ft/yr. This application may withdraw up to 960 ac-ft/yr, if approved. Therefore, based on the statewide hydrologic budget, there is reasonable probability unappropriated water is available for this application.

Table 3: Summary of estimated average annual withdrawals and appropriations

Estimation Type	Count	Est. Use (ac-ft/yr)
Irrigation	34	10,497
Volume Limit	43	24,536
Diversion Rate Limit	89	16,897
<i>Subtotal (authorized to withdraw)</i>	<i>166</i>	<i>51,930</i>
Future Use	11	13,444
Pending/Deferred/held	5	3,739
Grand total	182	69,113

Local Hydrologic Budget

Carter, et al [15] used streamflow, precipitation, spring flow, estimated ground water flow, and well withdrawal data from 1987 to 1996 for the hydrologic budgets. This application is in Subarea 1 of their report. The boundaries of the Carter et al. [15] subareas were designed to minimize flow across subarea boundaries. Carter et al. [15] estimated the total recharge to the Madison and Minnelusa aquifers in Subarea 1 was 130.7 cfs. Assuming 55% of the recharge goes to the Madison aquifer, the estimated recharge to the Madison aquifer in Subarea 1 is 71.9 cfs, or approximately 52,100 ac-ft/yr [12] [15]. Carter, et al. [15] do not provide values for the recharge area of the Madison and Minnelusa formations for each subarea in their report, so it is possible the proportion of recharge area to those two aquifers is different within each subarea. There are 34 water rights/permits authorized to withdraw from Subarea 1 and two future use permits reserving water from Subarea 1. Domestic well withdrawals are negligible on the scale of this hydrologic budget. Using the same methods as described in the Statewide Discharge section, the total estimated withdrawal from Subarea 1 is 16,720 ac-ft/yr. This application may withdraw up to 960 ac-ft/yr, if approved. Therefore, based on the local hydrologic budget in combination with other information available, there is reasonable probability unappropriated water is available for this application.

Observation Wells

Administrative Rule of South Dakota 74:02:05:07 requires that the Water Management Board rely upon the record of observation wells, in addition to other information, to determine that recharge exceeds withdrawals to approve an application. The Water Rights Program maintains 25 observation wells completed into the Madison aquifer [18]. The nearest observation well to this application is LA-88C, located approximately 9 miles south of this application [18]. Figure 1 shows depth to water levels from top of casing in LA-88C [18]. Water level data in Observation Well LA-88C is representative of the fluctuations in the Madison aquifer in the area of this application. Water level data in the observation well shows a rising trend, on average. In general, water levels rise during periods of higher-than-average rainfall and decline during periods of lower-than-average rainfall, as well as seasonal declines from nearby water rights/permits. This means that recharge and natural discharge are the dominant effects in the aquifer and natural discharge is available for capture. Therefore, based on observation well analysis, there is reasonable probability unappropriated water is available for this application.

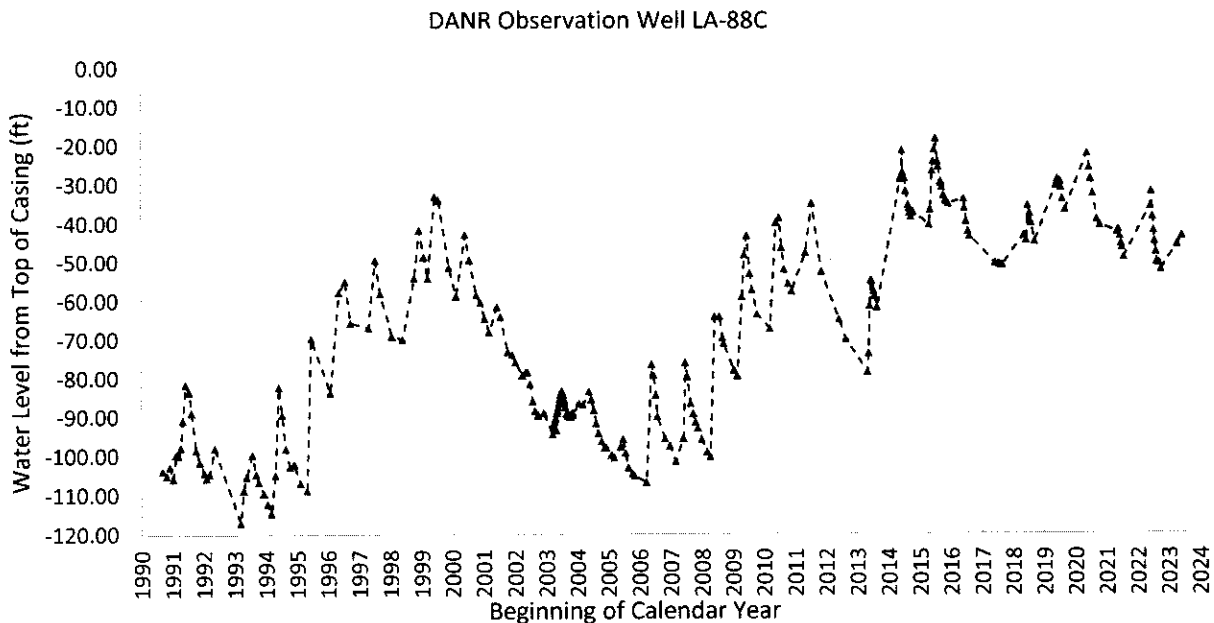


Figure 1: Water levels in Observation Well LA-88C [18]

Possibility of Unlawful Impairment of Existing Water Rights

The nearest water right/permit to this application is Water Right No. 1311-1 held by Cody Kloeckl, located approximately 0.9 miles west of this application, as described in the Hydrogeologic Characteristics section of this report. The nearest domestic well that is likely to be completed into the Madison aquifer on file with the Water Rights Program is located approximately 3.1 miles south of this application. The location of domestic wells is provided by the well driller on the well completion report. The Water Rights Program has historically interpreted an unlawful impairment of existing water rights to occur if a junior water right/permit causes a nearby adequate well with a senior water right/permit to become unable to withdraw at the rate it is entitled to or, if a domestic well is impacted, a water right/permit causes an adequate domestic well to be unable to withdraw at the rate needed to supply reasonable domestic use of water. Administrative Rule of South Dakota 74:02:04:20(6) defines an adequate well as:

...a well constructed or rehabilitated to allow various withdrawal methods to be used, to allow the inlet to the pump to be placed not less than 20 feet into the saturated aquifer or formation material when the well is constructed, or to allow the pump to be placed as near to the bottom of the aquifer as is practical if the aquifer thickness is less than 20 feet

In the hearing for Water Permit Application No. 2313-2 for Coca-Cola Bottling Company, the Water Management Board determined that to put the waters of the state to maximum beneficial use, hydraulic head would not be protected as a means of water delivery [19]. Some drawdown from this application is likely to occur and nearby well owners may need to lower their pumps or install pumps to access the water in the aquifer. Exact aquifer behavior cannot be known without an aquifer performance test. The applicant must control their withdrawals so that nearby water

rights/permits and adequate domestic wells are able to withdraw necessary water. There is no record of well interference complaints from the Madison aquifer in Butte County [20]. Observation wells completed into this aquifer near larger appropriative wells show limited drawdown when the large appropriative wells are in use [18]. Given the lack of well interference complaints in this aquifer in Butte County and limited drawdown shown in observation wells completed near larger appropriations, there is reasonable probability this application can be developed without unlawful impairment of existing water rights with adequate wells and adequate domestic wells.

Springs

The nearest major spring supplied by the Madison aquifer is the Old Spearfish Hatchery Spring, located approximately 4.5 miles south of this application. [21]. Upon considering the deferral of Water Permit Application No. 2585-2 for Southern Black Hills Water System, the Water Management Board adopted a conclusion of law stating in part, "... The only protection South Dakota law provides when considering an application for an underground water permit for flow from an artesian spring is under the public interest criteria" [22]. Given the distance between the proposed well site and the nearest springs, there is reasonable probability this application can be developed without noticeably impacting spring flow from the Madison aquifer.

Special Consideration: Flowing Wells

The well for this application is likely to flow at land surface. Administrative Rule of South Dakota 74:02:04:76 provides that any well that may flow shall be constructed to allow the completed well to be completely shut off. The rule allows the flow to be reduced to no more than 5 gallons per minute to prevent freezing when not in use.

Conclusions

1. Water Permit Application No. 2031-1 proposes to appropriate 960 ac-ft/yr at a maximum diversion rate of 2.22 cfs, from one well to be completed into the Madison aquifer located in the NE ¼ SE ¼ Section 34-T8N-R2E Black Hills Meridian for municipal use.
2. Based on the hydrologic budget and observation well analysis, there is reasonable probability unappropriated water is available for this application.
3. There is reasonable probability this application can be developed without unlawful impairment of existing water rights with adequate wells and adequate domestic wells.
4. There is reasonable probability this application can be developed without noticeably impacting springs supplied by the Madison aquifer.
5. This application is subject to a 20-year term limitation.



Kimberly C. Drennon, E.I.
Natural Resources Engineer II – DANR Water Rights Program

References

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